MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
Water Quality Assessments and Planning
629 E. Main Street P.O. Box 10009 Richmond, Virginia 23240

SUBJECT: Flow Frequency Determination
Hopyard Farm WWTP – VA0089338

TO: Anna Westernik, NRO

FROM: Paul E. Herman, P.E., WQAP

DATE: July 19, 2001

COPIES: Durwood Willis, Jon VanSoestbergen, File

This memo supersedes my March 22, 1996, memo to Lyle Anne Collier concerning the subject VPDES permit.

The Hopyard Farm WWTP discharges to the Rappahannock River near Port Royal, VA. Flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

At the discharge point, the Rappahannock River is tidal. Flow frequencies are indeterminable in tidal streams. The freshwater inflow to the tidal Rappahannock River has been provided for modeling purposes and is based on the data from the gage on the Rappahannock River near Fredericksburg, VA.

The flow frequencies for the Rappahannock River near Fredericksburg are provided below. For the purposes of this analysis, the 1Q10 and 7Q10 for the high temperature period, May through October, and the low temperature period, November through April, have been provided in place of the usual flow-tiered flow frequencies. For more information on tiering permit limits based on flow or temperature, please contact M. Dale Phillips at 698-4077.

The drainage area of the Rappahannock River near the discharge point is 1,755 mi^2.

Rappahannock River near Fredericksburg, VA (#01668000):

Drainage Area = 1,596 mi^2

High Temp 1Q10 = 39.6 cfs (25.6 mgd)	Low Temp 1Q10 = 163 cfs (105 mgd)
High Temp 7Q10 = 47.9 cfs (31 mgd)	Low Temp 7Q10 = 196 cfs (127 mgd)
30Q5 = 130 cfs (84 mgd)	HM = 471 cfs (304 mgd)

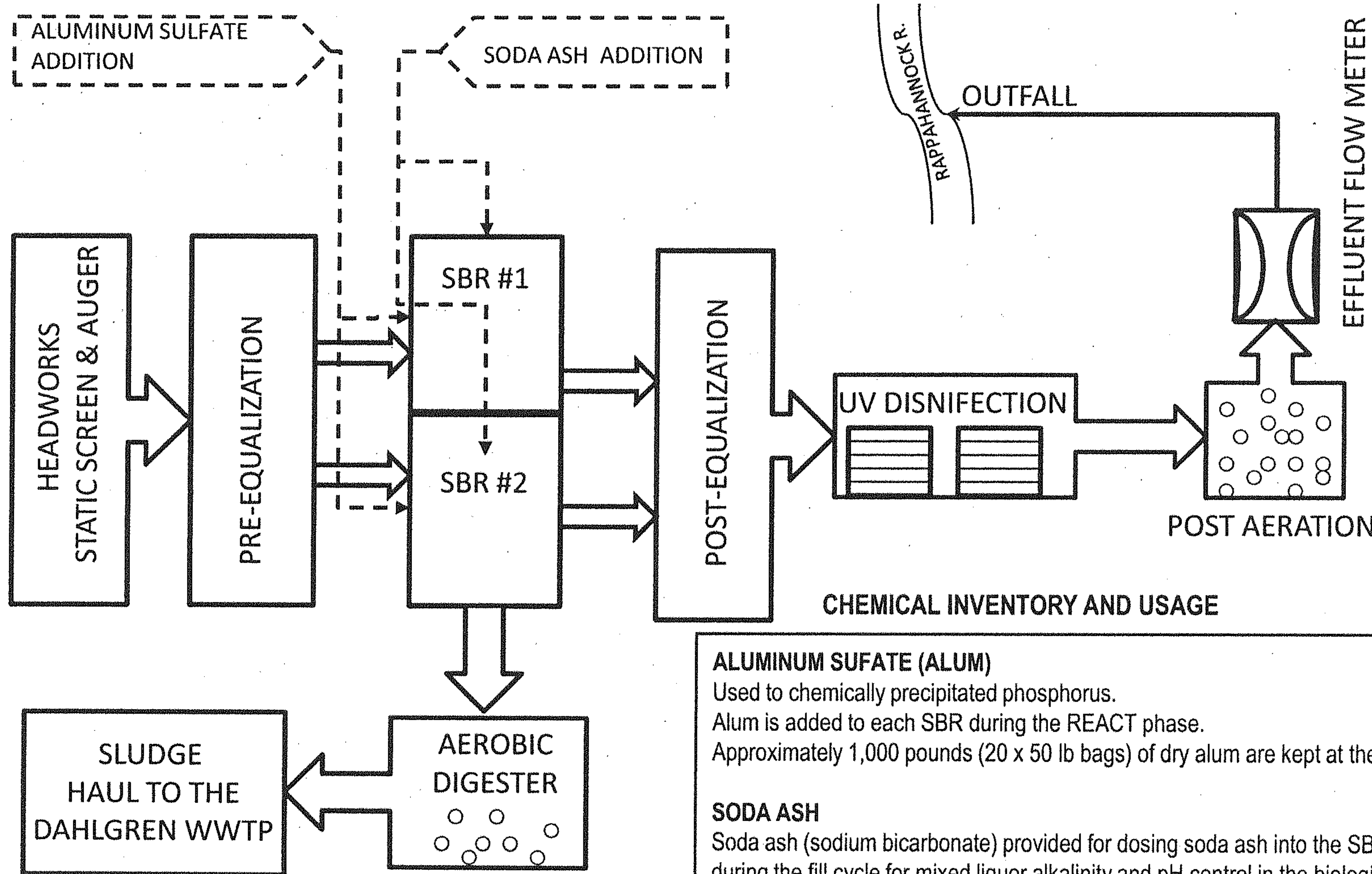
Annual average = 1,686 cfs (1,090 mgd)

If you have any questions concerning this analysis, please let me know.

Attachment 1

Flow Frequency Memorandum

HOPYARD FARMS WWTP NARRATIVE



CHEMICAL INVENTORY AND USAGE

ALUMINUM SUFATE (ALUM)

Used to chemically precipitated phosphorus.
Alum is added to each SBR during the REACT phase.
Approximately 1,000 pounds (20 x 50 lb bags) of dry alum are kept at the Plant

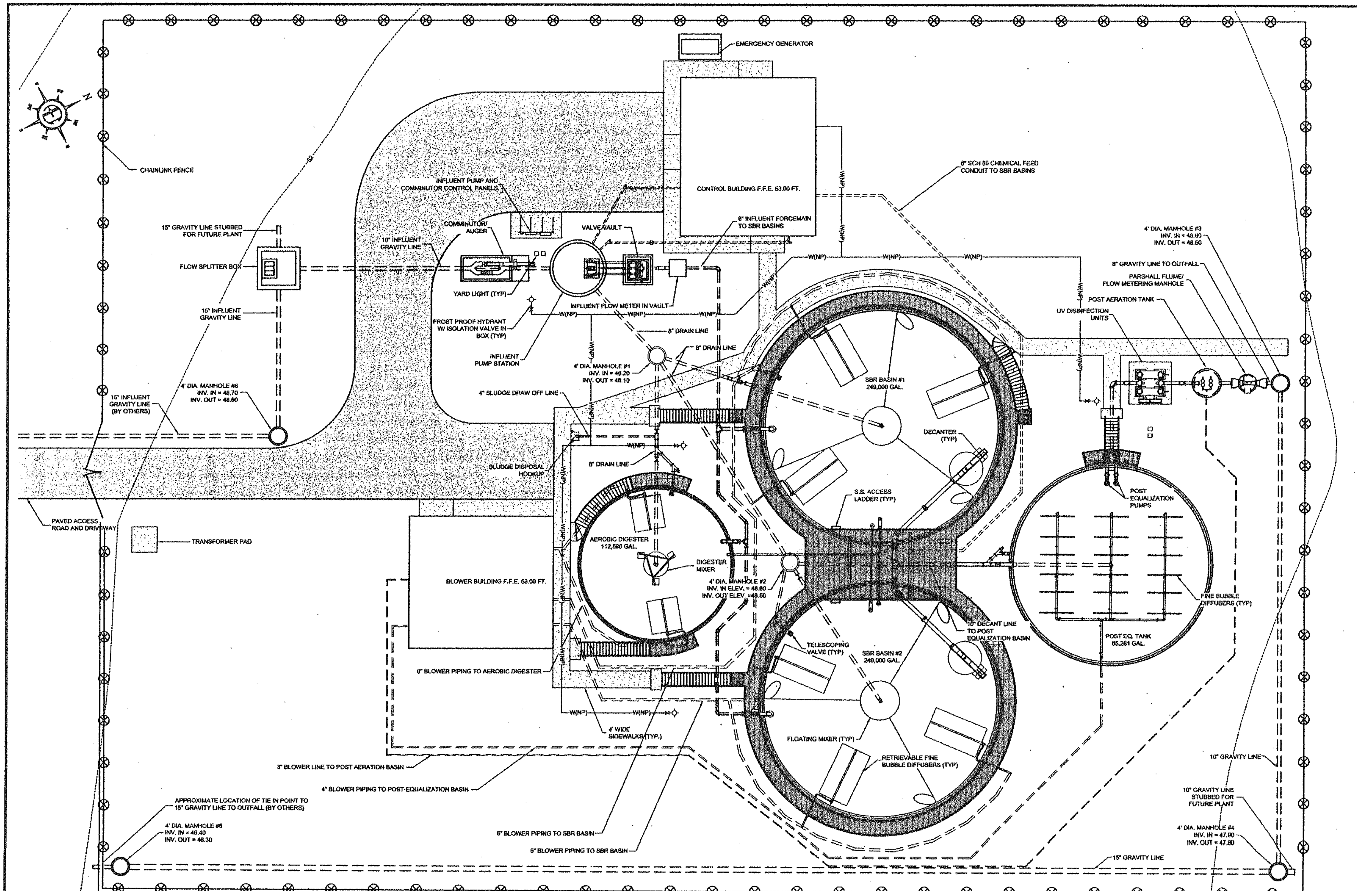
SODA ASH

Soda ash (sodium bicarbonate) provided for dosing soda ash into the SBR basins during the fill cycle for mixed liquor alkalinity and pH control in the biological nitrification process, as needed.
Approximately 1,000 pounds (20 x 50 lb bags) of dry alum are kept at the Plant

RETAW ENGINEERING, LLC.
Planning • Permitting • Design • Operations
2903 Sagecreek Circle
Midlothian, Virginia 23112
www.retaweng.com

PROJECT NO.: 40828-30-11
DRAWN BY: IGNATIUS MUTOTI, PhD, PE
DATE: 10/21/2011 SCALE: NTS

Attachment 2



NOTE:

THE DESIGN OF THE 15" GRAVITY LINE TO THE WWTP SITE AND FROM THE WWTP SITE TO THE OUTFALL IS PROVIDED ON SEPARATE PLANS BY THE ENGINEERING GROUP, INC.

OVERALL EQUIPMENT LAYOUT

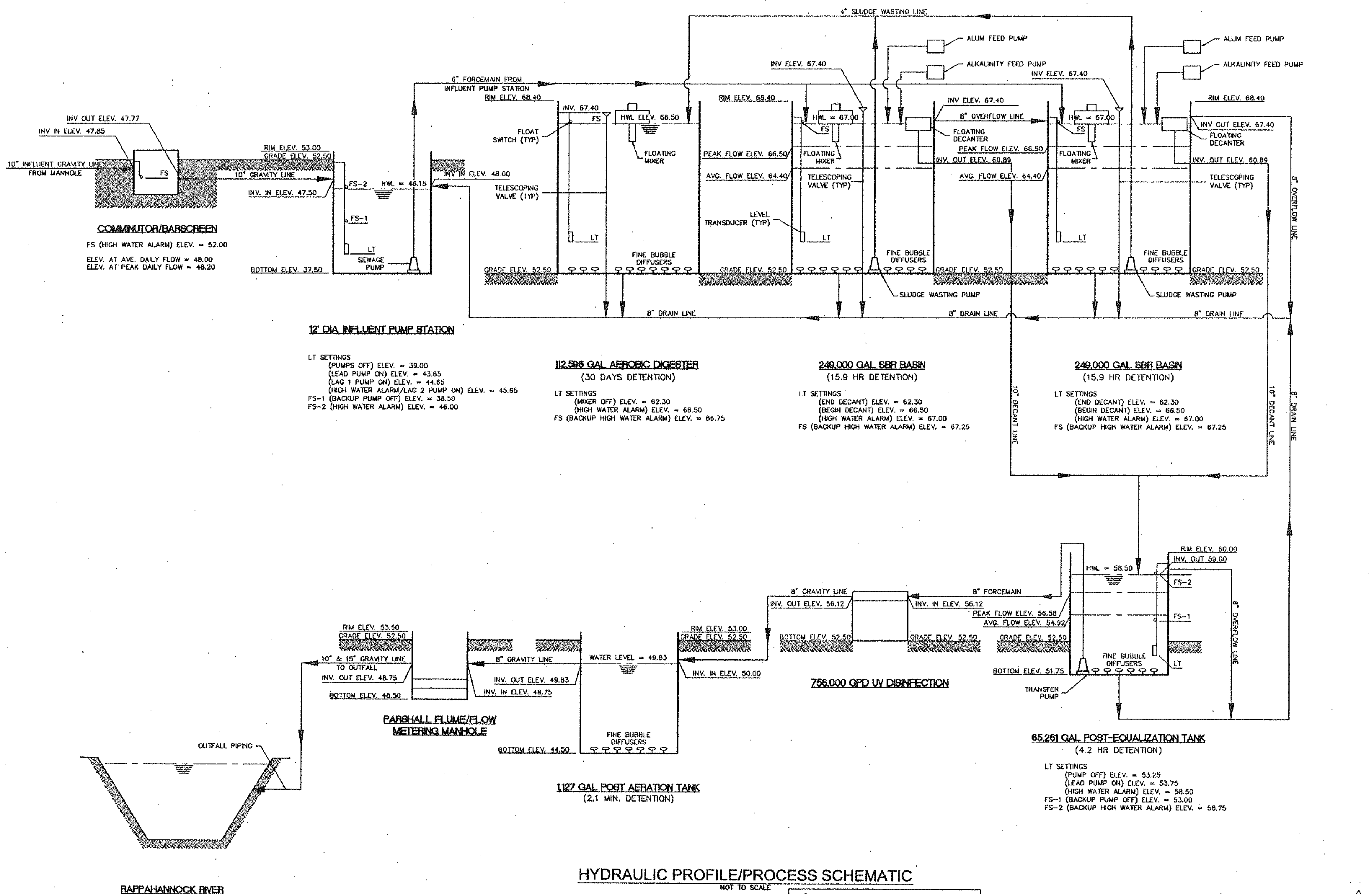
(IN FEET)
1 inch = 10 ft.

RETAW ENGINEERING LLC.
Planning • Permitting • Design • Operations
2903 Sagecreek Circle
Midlothian, Virginia 23112
www.retawengineering.com

HOPYARD FARMS WASTEWATER TREATMENT PLANT

SITE PLAN & YARD PIPING

PROJECT NO.: 40828-30-11
DWG SOURCE: RECORD DWGS 10/19/04
DATE: 10/21/2011
SCALE: AS SHOWN



HYDRAULIC PROFILE/PROCESS SCHEMATIC

NOT TO SCALE

RETAW ENGINEERING LLC.
Planning • Permitting • Design • Operations
2923 Sagecreek Circle
Midlothian, Virginia 23112
www.retaweng.com

HOPYARD FARMS WWTP
HYDRAULIC PROFILE

PROJET NO.: 40828-30-11
DATE: 10/21/2011
SCALE: NTS
SOURCE: AS BUILT DWG 10/19/04

AVERAGE AND PEAK FLOW ELEVATIONS ADDED.

3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 700 ft Scale: 1 : 24,000 Detail: 13-1 Datum: WGS84

Hopyard WWTP
Outfall 001 Location

Attachment 3

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
NORTHERN REGIONAL OFFICE
13901 Crown Court, Woodbridge, Virginia 22193
(703) 583-3800 Fax (703) 583-3821
www.deq.virginia.gov

Douglas Domenech
Secretary of Natural Resources

David K. Paylor
Director

Thomas A. Faha
Regional Director

July 7, 2011

Mr. Chris Thomas
King George County Service Authority (KGCSA)
9207 Kings Highway
King George, VA 22485

Re: **Hopyard Farms WWTP, Permit # VA0089338**

Dear Mr. Thomas:

Attached is a copy of the Site Inspection Report generated from the Facility Recon Inspection conducted at Hopyard Farms – Wastewater Treatment Plant (WWTP) on June 7, 2011. This letter is not intended as a case decision under the Virginia Administrative Process Act, Va. Code § 2.2-4000 et seq. (APA).

If you have any questions or comments concerning this report, please feel free to contact me at the Northern Regional Office at (703) 583-3882 or by E-mail at Sharon.Allen@deq.virginia.gov.

Sincerely,

Sharon Allen

Sharon Allen
Environmental Specialist II

cc: Permits / DMR File

Electronic copy sent:
Compliance Manager, Compliance Auditor – DEQ
Jeff Hockaday- KGCSA

Attachment 4

VA DEQ Recon Inspection Report

Virginia Department of Environmental Quality

RECON INSPECTION REPORT

FACILITY NAME: Hopyard Farms WWTP	**INSPECTION DATE:**	June 7, 2011	
	INSPECTOR	S. Allen	
PERMIT No.: VA0089338	**REPORT DATE:**	July 7, 2011	
TYPE OF FACILITY: ☐ Municipal ☐ Major ☐ Industrial ☐ Minor ☐ Federal ☐ Small Minor ☐ HP ☐ LP	**TIME OF INSPECTION:**	Arrival 1045	Departure 1145
	TOTAL TIME SPENT (including prep & travel)	6 hrs	
PHOTOGRAPHS: ☑ Yes ☐ No	**UNANNOUNCED INSPECTION?**	☑ Yes ☐ No	
REVIEWED BY / Date: Earl L. Stuart 7/6/11			
PRESENT DURING INSPECTION: DEQ- Ed Stuart; KGCSA – Chris Thomas, Chad Sullivan			

INSPECTION OVERVIEW AND CONDITION OF TREATMENT UNITS

- The purpose of this site visit was for S. Allen to meet the KGCSA staff and become familiar with the facility.
- Mr. Sullivan conducted tour of the facility and Mr. Thomas met us on site.
- Mr. Sullivan said the current influent flow is ~ 20,000 MGD, which is well below the facility's design capacity of 0.375 MGD. This includes backwash water received from the Hopyard Farms Water Treatment Plant once per week.
- Raw wastewater is pumped from the main pump station in the Hopyard Farms development.
- The headworks consists of a bar screen and screw auger which removes rags and deposits them in a trash can for disposal. There is also a bypass channel with a manual bar screen.
- After the headworks, water enters the Influent Pump Station and is pumped up into the two SBRs. Both SBRs were in service.
- Once a week, the SBRs are decanted to the post EQ tank. From this tank, water passes through UV disinfection, post aeration, and discharge to the Rappahannock River.
- The post EQ tank was empty. Because there was no flow from the post EQ tank, the UV system was turned off.
- Operators usually batch-discharge from this facility on Thursdays to allow for sample collection before the end of the week.

Permit #	VA0089338

EFFLUENT FIELD DATA: NA

Flow MGD	**Dissolved Oxygen** mg/L	**TRC (Contact Tank)** mg/L
pH S.U.	**Temperature** °C	**TRC (Final Effluent)** mg/L

Was a Sampling Inspection conducted? ☐ Yes (see Sampling Inspection Report) ☑ No

CONDITION OF OUTFALL AND EFFLUENT CHARACTERISTICS:

1. Type of outfall: ☐ Shore based ☐ Submerged Diffuser? ☐ Yes ☐ No
2. Are the outfall and supporting structures in good condition? ☐ Yes ☐ No
3. Final Effluent (evidence of following problems): ☐ Sludge bar ☐ Grease ☐ Turbid effluent ☐ Visible foam ☐ Unusual color ☐ Oil sheen
4. Is there a visible effluent plume in the receiving stream? ☐ Yes ☐ No
5. Receiving stream: ☐ No observed problems ☐ Indication of problems (explain below)

Comments:

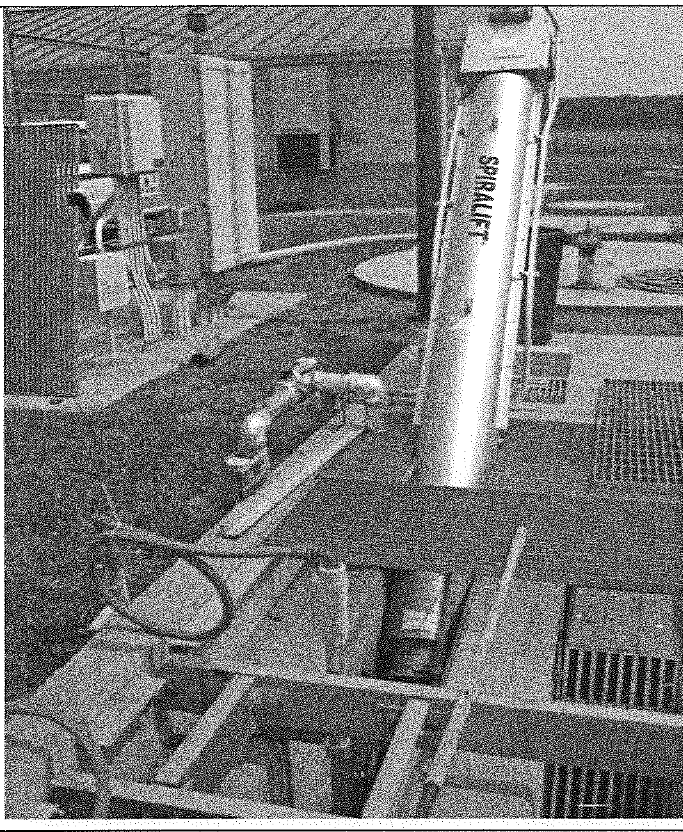
Not observed this visit.

REQUEST for COMPLIANCE ACTION:

1. **None**

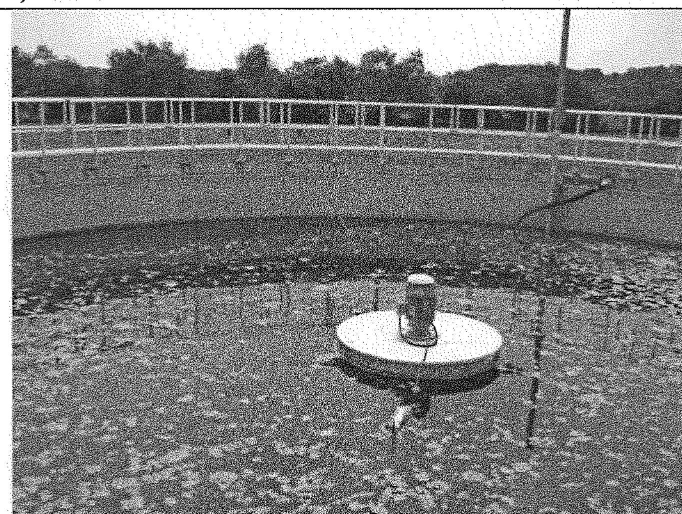
NOTES and COMMENTS:

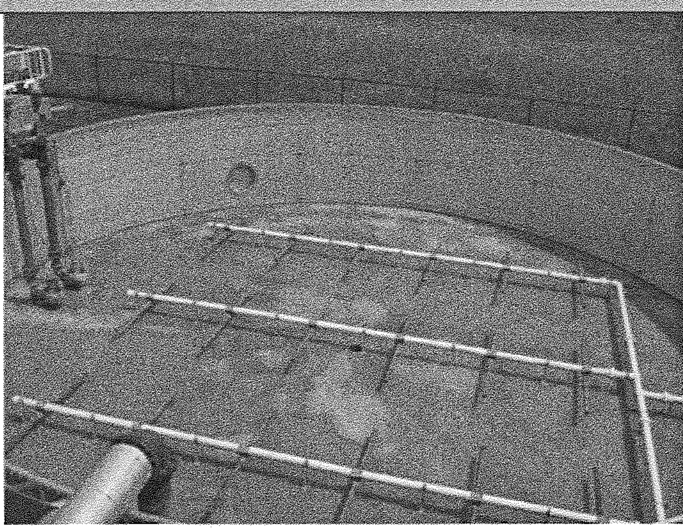
- **Mr. Thomas asked about the Operations &Maintenance manual for this facility. A revised manual had been submitted to DEQ in 2009, but he had not received an approval letter.**
- **NRO did receive the revised O&M manual on January 12, 2009. It was reviewed by VPDES permitting and compliance staff, although an acceptance letter was not sent to KCGSA at that time.**
- **An acknowledgement/approval letter was mailed to Mr. Thomas at KGCSA on June 17, 2011.**

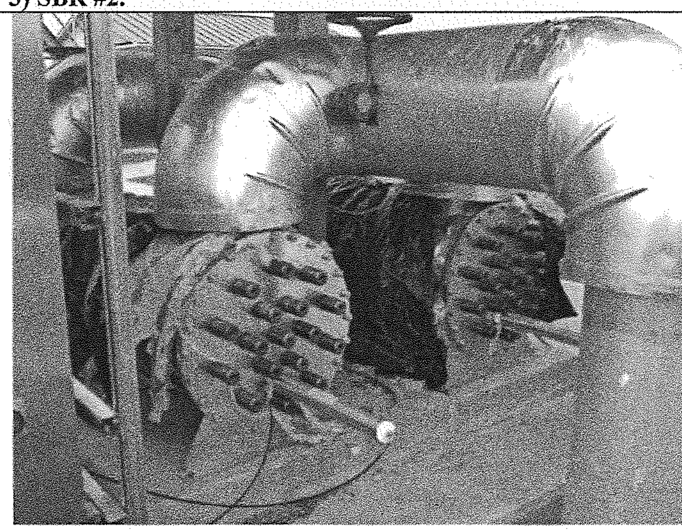


1) Influent channel and headworks.


2) SBR #1


3) SBR #2.


4) Post EQ tank.


5) UV system.

Facility name: Hopyard Farms WWTP
Site Inspection Date: June 7, 2011

VPDES Permit No. VA0089338
Photos & Layout by: S. Allen

To:	Joan Crowther
From:	Jennifer Carlson
Date:	June 27, 2012
Subject:	Planning Statement for Hopyard WWTP
Permit Number:	VA0089338

Information for Outfall 001:

Discharge Type: Municipal
Discharge Flow: 0.375 MGD and 0.5 MGD
Receiving Stream: Rappahannock River
Latitude / Longitude: 38 14 39/-77 13 32
Rivermile: 89.4
Streamcode: 3-RPP
Waterbody: VAN-E21E
Water Quality Standards: Class II, Section 1, sp stds. a
Drainage Area: 1,755 mi^2

1. Please provide water quality monitoring information for the receiving stream segment. If there is not monitoring information for the receiving stream segment, please provide information on the nearest downstream monitoring station, including how far downstream the monitoring station is from the outfall.

This facility discharges into the tidal Rappahannock River. The nearest DEQ monitoring station is 3-RPP091.55, located approximately 0.43 miles upstream from Outfall 001. The following is the water quality summary for this segment of the Rappahannock River, as taken from the Draft 2012 Assessment*:

Class II, Section 1, special stds. a.

DEQ Chesapeake Bay and ambient stations 3-RPP088.22, located near the confluence with Jones Top Creek; 3-RPP091.55 at Buoy 89; and 3-RPP095.56, located approximately 500 yards upstream from the Four Winds Campground boat ramp. Fish consumption use assessed using DEQ fish tissue/sediment station 3-RPP080.19, located in a downstream segment.

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory and sufficient excursions above the fish tissue value (TV) for PCBs in fish tissue. Additionally, excursions above the risk-based tissue value (TV) of 300 parts per billion (ppb) for mercury (Hg) in fish tissue was recorded in one species of fish (1 total samples) collected in 2006 at monitoring station 3-RPP080.19 (channel catfish), noted by an observed effect.

The wildlife, recreation and aquatic life uses are considered fully supporting. The Chesapeake Bay TMDL was completed in 2010. The shellfishing use was not assessed.

**The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.*

2. Does this facility discharge to a stream segment on the 303(d) list? If yes, please fill out Table A.

   Yes. Please note that the recreation use in this segment of the Rappahannock River was identified for delisting in the Draft 2012 IR based upon an acceptable exceedance rate of *E. coli* bacteria. The stretch of the tidal Rappahannock River from Ware Creek downstream to Mill Creek is no longer impaired for bacteria. The tidal Rappahannock from the fall line at Route 1 to Ware Creek remains listed as impaired for bacteria. A bacteria TMDL for the Tidal Rappahannock River was completed and approved by EPA. The facility received a WLA in the TMDL, please see the information below.

Table A. 303(d) Impairment and TMDL information for the receiving stream segment

Waterbody Name	Impaired Use	Cause	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Impairment Information in the Draft 2012 Integrated Report*						
Rappahannock River	Fish Consumption	PCBs	No	N/A	---	2016
	Delisted (Recreation)	*Delisted (E. coli)*	Tidal Freshwater Rappahannock River Bacteria	8.70E+11 cfu/year *E. coli*	126 cfu/100ml --- 0.5 MGD	---

**The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.*

3. Are there any downstream 303(d) listed impairments that are relevant to this discharge? If yes, please fill out Table B.

   No.

4. Is there monitoring or other conditions that Planning/Assessment needs in the permit?

   In support for the PCB TMDL that is scheduled to be developed for the tidal Rappahannock River by 2016, this facility is a candidate for low-level PCB monitoring, based upon its designation as a minor municipal facility. Low-level PCB analysis uses EPA Method 1668B, which is capable of detecting low-level concentrations for all 209 PCB congeners. The Assessment/TMDL Staff has concluded that low-level PCB monitoring is not warranted for this facility, as the residential area it serves is relatively new and is not expected to be a source of PCBs. Based on this information, this facility will not be requested to monitor for low-level PCBs.

   There is a completed downstream TMDL for the aquatic life use impairment for the Chesapeake Bay. However, the Bay TMDL and the WLAs contained within the TMDL are not addressed in this planning statement.

5. Fact Sheet Requirements – Please provide information regarding any drinking water intakes located within a 5 mile radius of the discharge point.

   There are no public water supply intakes within a 5 mile radius.

Dissolved Oxygen Criteria (9VAC25-260-185)

Designated Use	Criteria Concentration/Duration	Temporal Application
Migratory fish spawning and nursery	7-day mean > 6 mg/L (tidal habitats with 0-0.5 ppt salinity)	February 1 – May 31
	Instantaneous minimum > 5 mg/L	
Open-water[1,2]	30-day mean > 5.5 mg/L (tidal habitats with 0-0.5 ppt salinity) 30-day mean > 5 mg/L (tidal habitats with >0.5 ppt salinity)	Year-round
	7-day mean > 4 mg/L	
	Instantaneous minimum > 3.2 mg/L at temperatures < 29°C Instantaneous minimum > 4.3 mg/L at temperatures > 29°C	
Deep-water	30-day mean >3 mg/L	June 1-September 30
	1-day mean > 2.3 mg/L	
	Instantaneous minimum > 1.7 mg/L	
Deep-channel	Instantaneous minimum > 1 mg/L	June 1-September 30

[1]See subsection aa of 9VAC25-260-310 for site specific seasonal open-water dissolved oxygen criteria applicable to the tidal Mattaponi and Pamunkey Rivers and their tidal tributaries.

[2]In applying this open-water instantaneous criterion to the Chesapeake Bay and its tidal tributaries where the existing water quality for dissolved oxygen exceeds an instantaneous minimum of 3.2 mg/L, that higher water quality for dissolved oxygen shall be provided antidegradation protection in accordance with section 30 subsection A.2 of the Water Quality Standards.

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Hopyard Farms WWTP -Acute WLAs   Permit No.: VA0089338

Receiving Stream: Rappahannock River   Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	50 mg/L
90% Temperature (Annual) =	28.2 deg C
90% Temperature (Wet season) =	15 deg C
90% Maximum pH =	7.6 SU
10% Maximum pH =	SU
Tier Designation (1 or 2) =	1
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows

1Q10 (Annual) =	1 MGD
7Q10 (Annual) =	1 MGD
30Q10 (Annual) =	1 MGD
1Q10 (Wet season) =	1 MGD
30Q10 (Wet season)	1 MGD
30Q5 =	1 MGD
Harmonic Mean =	1 MGD

Mixing Information

Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	37 mg/L
90% Temp (Annual) =	26 deg C
90% Temp (Wet season) =	15 deg C
90% Maximum pH =	7.5 SU
10% Maximum pH =	SU
Discharge Flow =	1 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	--	--	na	2.0E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.9E+01	--	--	--	--	--	--	--	--	--	--	na	1.9E+01
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	5.0E+00	--	--	--	--	--	--	--	--	--	--	na	5.0E+00
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	6.0E+00	--	na	1.0E-03	--	--	--	--	--	--	--	--	6.0E+00	--	na	1.0E-03
Ammonia-N (mg/l) (Yearly)	0	1.85E+01	1.86E+00	na	--	3.70E+01	3.72E+00	na	--	--	--	--	--	--	--	--	--	3.70E+01	3.72E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	1.85E+01	4.05E+00	na	--	3.70E+01	8.11E+00	na	--	--	--	--	--	--	--	--	--	3.70E+01	8.11E+00	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	8.0E+04	--	--	--	--	--	--	--	--	--	--	na	8.0E+04
Antimony	0	--	--	na	6.4E+02	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	--	--	na	1.3E+03
Arsenic	0	3.4E+02	1.5E+02	na	--	6.8E+02	3.0E+02	na	--	--	--	--	--	--	--	--	--	6.8E+02	3.0E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	1.0E+03	--	--	--	--	--	--	--	--	--	--	na	1.0E+03
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	4.0E-03	--	--	--	--	--	--	--	--	--	--	na	4.0E-03
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E-01
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E-01
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E-01
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E-01
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	1.1E+01	--	--	--	--	--	--	--	--	--	--	na	1.1E+01
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.3E+05	--	--	--	--	--	--	--	--	--	--	na	1.3E+05
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	4.4E+01	--	--	--	--	--	--	--	--	--	--	na	4.4E+01
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	2.8E+03	--	--	--	--	--	--	--	--	--	--	na	2.8E+03
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.8E+03	--	--	--	--	--	--	--	--	--	--	na	3.8E+03
Cadmium	0	1.5E+00	5.9E-01	na	--	3.1E+00	1.2E+00	na	--	--	--	--	--	--	--	--	--	3.1E+00	1.2E+00	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	3.2E+01	--	--	--	--	--	--	--	--	--	--	na	3.2E+01
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	4.8E+00	8.6E-03	na	1.6E-02	--	--	--	--	--	--	--	--	4.8E+00	8.6E-03	na	1.6E-02
Chloride	0	8.6E+05	2.3E+05	na	--	1.7E+06	4.6E+05	na	--	--	--	--	--	--	--	--	--	1.7E+06	4.6E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	3.8E+01	2.2E+01	na	--	--	--	--	--	--	--	--	--	3.8E+01	2.2E+01	na	--
Chlorobenzene					1.6E+03	--	--	na	3.2E+03	--	--	--	--	--	--	--	--	--	--	na	3.2E+03

Attachment 7

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	2.6E+02	--	--	--	--	--	--	--	--	--	--	na	2.6E+02
Chloroform	0	--	--	na	1.1E+04	--	--	na	2.2E+04	--	--	--	--	--	--	--	--	--	--	na	2.2E+04
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	3.2E+03	--	--	--	--	--	--	--	--	--	--	na	3.2E+03
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	na	3.0E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.7E-01	8.2E-02	na	--	--	--	--	--	--	--	--	--	1.7E-01	8.2E-02	na	--
Chromium III	0	2.9E+02	3.7E+01	na	--	5.8E+02	7.5E+01	na	--	--	--	--	--	--	--	--	--	5.8E+02	7.5E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	3.2E+01	2.2E+01	na	--	--	--	--	--	--	--	--	--	3.2E+01	2.2E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	3.6E-02	--	--	--	--	--	--	--	--	--	--	na	3.6E-02
Copper	0	6.1E+00	4.4E+00	na	--	1.2E+01	8.8E+00	na	--	--	--	--	--	--	--	--	--	1.2E+01	8.8E+00	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	4.4E+01	1.0E+01	na	3.2E+04	--	--	--	--	--	--	--	--	4.4E+01	1.0E+01	na	3.2E+04
DDD [C]	0	--	--	na	3.1E-03	--	--	na	6.2E-03	--	--	--	--	--	--	--	--	--	--	na	6.2E-03
DDE [C]	0	--	--	na	2.2E-03	--	--	na	4.4E-03	--	--	--	--	--	--	--	--	--	--	na	4.4E-03
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	2.2E+00	2.0E-03	na	4.4E-03	--	--	--	--	--	--	--	--	2.2E+00	2.0E-03	na	4.4E-03
Demeton	0	--	1.0E-01	na	--	--	2.0E-01	na	--	--	--	--	--	--	--	--	--	--	2.0E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	3.4E-01	3.4E-01	na	--	--	--	--	--	--	--	--	--	3.4E-01	3.4E-01	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E-01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	--	--	na	2.6E+03
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	1.9E+03
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.8E+02	--	--	--	--	--	--	--	--	--	--	na	3.8E+02
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	5.6E-01	--	--	--	--	--	--	--	--	--	--	na	5.6E-01
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	3.4E+02	--	--	--	--	--	--	--	--	--	--	na	3.4E+02
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	7.4E+02	--	--	--	--	--	--	--	--	--	--	na	7.4E+02
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	--	--	na	1.4E+04
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	--	--	na	2.0E+04
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	5.8E+02	--	--	--	--	--	--	--	--	--	--	na	5.8E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	na	3.0E+02
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	4.2E+02	--	--	--	--	--	--	--	--	--	--	na	4.2E+02
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	4.8E-01	1.1E-01	na	1.1E-03	--	--	--	--	--	--	--	--	4.8E-01	1.1E-01	na	1.1E-03
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	8.8E+04	--	--	--	--	--	--	--	--	--	--	na	8.8E+04
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	2.2E+06	--	--	--	--	--	--	--	--	--	--	na	2.2E+06
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	9.0E+03	--	--	--	--	--	--	--	--	--	--	na	9.0E+03
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	5.6E+02	--	--	--	--	--	--	--	--	--	--	na	5.6E+02
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	6.8E+01	--	--	--	--	--	--	--	--	--	--	na	6.8E+01
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	1.0E-07	--	--	--	--	--	--	--	--	--	--	na	1.0E-07
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	4.0E+00	--	--	--	--	--	--	--	--	--	--	na	4.0E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	4.4E-01	1.1E-01	na	1.8E+02	--	--	--	--	--	--	--	--	4.4E-01	1.1E-01	na	1.8E+02
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	4.4E-01	1.1E-01	na	1.8E+02	--	--	--	--	--	--	--	--	4.4E-01	1.1E-01	na	1.8E+02
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	4.4E-01	1.1E-01	--	--	--	--	--	--	--	--	--	--	4.4E-01	1.1E-01	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.7E-01	7.2E-02	na	1.2E-01	--	--	--	--	--	--	--	--	1.7E-01	7.2E-02	na	1.2E-01
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	6.0E-01	--	--	--	--	--	--	--	--	--	--	na	6.0E-01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	4.2E+03	--	--	--	--	--	--	--	--	--	--	na	4.2E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.8E+02	--	--	--	--	--	--	--	--	--	--	na	2.8E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	2.0E-02	na	--	--	--	--	--	--	--	--	--	--	2.0E-02	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	1.0E+00	7.6E-03	na	1.6E-03	--	--	--	--	--	--	--	--	1.0E+00	7.6E-03	na	1.6E-03
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	1.0E+00	7.6E-03	na	7.8E-04	--	--	--	--	--	--	--	--	1.0E+00	7.6E-03	na	7.8E-04
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	5.8E-03	--	--	--	--	--	--	--	--	--	--	na	5.8E-03
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	3.6E+02	--	--	--	--	--	--	--	--	--	--	na	3.6E+02
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	9.8E-02	--	--	--	--	--	--	--	--	--	--	na	9.8E-02
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	1.7E-01	--	--	na	3.4E-01	--	--	--	--	--	--	--	--	--	--	na	3.4E-01
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.9E+00	--	na	3.6E+00	--	--	--	--	--	--	--	--	1.9E+00	--	na	3.6E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	2.2E+03	--	--	--	--	--	--	--	--	--	--	na	2.2E+03
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	6.6E+01	--	--	--	--	--	--	--	--	--	--	na	6.6E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	4.0E+00	na	--	--	--	--	--	--	--	--	--	--	4.0E+00	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	--	--	--	--	--	--	--	--	na	3.6E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	--	--	na	1.9E+04
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	4.1E+01	4.7E+00	na	--	8.2E+01	9.4E+00	na	--	--	--	--	--	--	--	--	--	8.2E+01	9.4E+00	na	--
Malathion	0	--	1.0E-01	na	--	--	2.0E-01	na	--	--	--	--	--	--	--	--	--	--	2.0E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	- -	- -	2.8E+00	1.5E+00	- -	- -	--	--	--	--	--	--	--	--	2.8E+00	1.5E+00	- -	- -
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	3.0E+03	--	--	--	--	--	--	--	--	--	--	na	3.0E+03
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
Methoxychlor	0	--	3.0E-02	na	--	--	6.0E-02	na	--	--	--	--	--	--	--	--	--	--	6.0E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	9.0E+01	1.0E+01	na	4.6E+03	1.8E+02	2.0E+01	na	9.2E+03	--	--	--	--	--	--	--	--	1.8E+02	2.0E+01	na	9.2E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	na	1.4E+03
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	--	--	na	6.0E+01
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	1.2E+02	--	--	--	--	--	--	--	--	--	--	na	1.2E+02
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	1.0E+01	--	--	--	--	--	--	--	--	--	--	na	1.0E+01
Nonylphenol	0	2.8E+01	6.6E+00	--	--	5.6E+01	1.3E+01	na	--	--	--	--	--	--	--	--	--	5.6E+01	1.3E+01	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	1.3E-01	2.6E-02	na	--	--	--	--	--	--	--	--	--	1.3E-01	2.6E-02	na	--
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	2.8E-02	na	1.3E-03	--	--	--	--	--	--	--	--	--	2.8E-02	na	1.3E-03
Pentachlorophenol [C]	0	7.7E-03	5.9E-03	na	3.0E+01	1.5E-02	1.2E-02	na	6.0E+01	--	--	--	--	--	--	--	--	1.5E-02	1.2E-02	na	6.0E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	1.7E+06	--	--	--	--	--	--	--	--	--	--	na	1.7E+06
Pyrene	0	--	--	na	4.0E+03	--	--	na	8.0E+03	--	--	--	--	--	--	--	--	--	--	na	8.0E+03
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	4.0E+01	1.0E+01	na	8.4E+03	--	--	--	--	--	--	--	--	**4.0E+01**	**1.0E+01**	**na**	**8.4E+03**
Silver	0	8.2E-01	--	na	--	1.6E+00	--	na	--	--	--	--	--	--	--	--	--	**1.6E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane^{C}	0	--	--	na	4.0E+01	--	--	na	8.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.0E+01**
Tetrachloroethylene^{C}	0	--	--	na	3.3E+01	--	--	na	6.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.6E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	9.4E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.4E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+04**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene ^{C}	0	7.3E-01	2.0E-04	na	2.8E-03	1.5E+00	4.0E-04	na	5.6E-03	--	--	--	--	--	--	--	--	**1.5E+00**	**4.0E-04**	**na**	**5.6E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	9.2E-01	1.4E-01	na	--	--	--	--	--	--	--	--	--	**9.2E-01**	**1.4E-01**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+02**
1,1,2-Trichloroethane^{C}	0	--	--	na	1.6E+02	--	--	na	3.2E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.2E+02**
Trichloroethylene ^{C}	0	--	--	na	3.0E+02	--	--	na	6.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.0E+02**
2,4,6-Trichlorophenol ^{C}	0	--	--	na	2.4E+01	--	--	na	4.8E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.8E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride^{C}	0	--	--	na	2.4E+01	--	--	na	4.8E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.8E+01**
Zinc	0	5.8E+01	5.8E+01	na	2.6E+04	1.2E+02	1.2E+02	na	5.2E+04	--	--	--	--	--	--	--	--	**1.2E+02**	**1.2E+02**	**na**	**5.2E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.3E+03
Arsenic	1.8E+02
Barium	na
Cadmium	7.1E-01
Chromium III	4.5E+01
Chromium VI	1.3E+01
Copper	4.9E+00
Iron	na
Lead	5.6E+00
Manganese	na
Mercury	9.2E-01
Nickel	1.2E+01
Selenium	6.0E+00
Silver	6.6E-01
Zinc	4.6E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Hopyard Farms WWTF - Chronic WLAs   Permit No.: VA0089338

Receiving Stream: Rappahannock River   Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO3) =	50 mg/L	1Q10 (Annual) =	49 MGD	Annual - 1Q10 Mix =	100 %	Mean Hardness (as CaCO3) =	37 mg/L
90% Temperature (Annual) =	28.2 deg C	7Q10 (Annual) =	49 MGD	- 7Q10 Mix =	100 %	90% Temp (Annual) =	26 deg C
90% Temperature (Wet season) =	15 deg C	30Q10 (Annual) =	49 MGD	- 30Q10 Mix =	100 %	90% Temp (Wet season) =	15 deg C
90% Maximum pH =	7.6 SU	1Q10 (Wet season) =	49 MGD	Wet Season - 1Q10 Mix =	100 %	90% Maximum pH =	7.5 SU
10% Maximum pH =	SU	30Q10 (Wet season)	49 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	SU
Tier Designation (1 or 2) =	1	30Q5 =	49 MGD			Discharge Flow =	1 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	49 MGD				
Trout Present Y/N? =	n						
Early Life Stages Present Y/N? =	y						

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	5.0E+04	--	--	--	--	--	--	--	--	--	--	na	5.0E+04
Acrolein	0	--	--	na	9.3E+00	--	--	na	4.7E+02	--	--	--	--	--	--	--	--	--	--	na	4.7E+02
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	na	1.3E+02
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	1.5E+02	--	na	2.5E-02	--	--	--	--	--	--	--	--	1.5E+02	--	na	2.5E-02
Ammonia-N (mg/l) (Yearly)	0	1.71E+01	1.65E+00	na	--	8.55E+02	8.27E+01	na	--	--	--	--	--	--	--	--	--	8.55E+02	8.27E+01	na	--
Ammonia-N (mg/l) (High Flow)	0	1.71E+01	3.86E+00	na	--	8.55E+02	1.93E+02	na	--	--	--	--	--	--	--	--	--	8.55E+02	1.93E+02	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	2.0E+06	--	--	--	--	--	--	--	--	--	--	na	2.0E+06
Antimony	0	--	--	na	6.4E+02	--	--	na	3.2E+04	--	--	--	--	--	--	--	--	--	--	na	3.2E+04
Arsenic	0	3.4E+02	1.5E+02	na	--	1.7E+04	7.5E+03	na	--	--	--	--	--	--	--	--	--	1.7E+04	7.5E+03	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	--	--	na	2.6E+04
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	1.0E-01	--	--	--	--	--	--	--	--	--	--	na	1.0E-01
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	9.0E+00	--	--	--	--	--	--	--	--	--	--	na	9.0E+00
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	9.0E+00	--	--	--	--	--	--	--	--	--	--	na	9.0E+00
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	9.0E+00	--	--	--	--	--	--	--	--	--	--	na	9.0E+00
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	9.0E+00	--	--	--	--	--	--	--	--	--	--	na	9.0E+00
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	2.7E+02	--	--	--	--	--	--	--	--	--	--	na	2.7E+02
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	3.3E+06	--	--	--	--	--	--	--	--	--	--	na	3.3E+06
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	na	1.1E+03
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	7.0E+04	--	--	--	--	--	--	--	--	--	--	na	7.0E+04
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	9.5E+04	--	--	--	--	--	--	--	--	--	--	na	9.5E+04
Cadmium	0	1.8E+00	6.6E-01	na	--	8.9E+01	3.3E+01	na	--	--	--	--	--	--	--	--	--	8.9E+01	3.3E+01	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	8.0E+02	--	--	--	--	--	--	--	--	--	--	na	8.0E+02
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	1.2E+02	2.2E-01	na	4.1E-01	--	--	--	--	--	--	--	--	1.2E+02	2.2E-01	na	4.1E-01
Chloride	0	8.6E+05	2.3E+05	na	--	4.3E+07	1.2E+07	na	--	--	--	--	--	--	--	--	--	4.3E+07	1.2E+07	na	--
TRC	0	1.9E+01	1.1E+01	na	--	9.5E+02	5.5E+02	na	--	--	--	--	--	--	--	--	--	9.5E+02	5.5E+02	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	8.0E+04	--	--	--	--	--	--	--	--	--	--	na	8.0E+04

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	6.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.5E+03**
Chloroform	0	--	--	na	1.1E+04	--	--	na	5.5E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.5E+05**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	8.0E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.0E+04**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	7.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.5E+03**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	4.2E+00	2.1E+00	na	--	--	--	--	--	--	--	--	--	**4.2E+00**	**2.1E+00**	**na**	**--**
Chromium III	0	3.2E+02	4.2E+01	na	--	1.6E+04	2.1E+03	na	--	--	--	--	--	--	--	--	--	**1.6E+04**	**2.1E+03**	**na**	**--**
Chromium VI	0	1.6E+01	1.1E+01	na	--	8.0E+02	5.5E+02	na	--	--	--	--	--	--	--	--	--	**8.0E+02**	**5.5E+02**	**na**	**--**
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	9.0E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.0E-01**
Copper	0	7.0E+00	4.9E+00	na	--	3.5E+02	2.5E+02	na	--	--	--	--	--	--	--	--	--	**3.5E+02**	**2.5E+02**	**na**	**--**
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	1.1E+03	2.6E+02	na	8.0E+05	--	--	--	--	--	--	--	--	**1.1E+03**	**2.6E+02**	**na**	**8.0E+05**
DDD [C]	0	--	--	na	3.1E-03	--	--	na	1.6E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E-01**
DDE [C]	0	--	--	na	2.2E-03	--	--	na	1.1E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E-01**
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	5.5E+01	5.0E-02	na	1.1E-01	--	--	--	--	--	--	--	--	**5.5E+01**	**5.0E-02**	**na**	**1.1E-01**
Demeton	0	--	1.0E-01	na	--	--	5.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**5.0E+00**	**na**	**--**
Diazinon	0	1.7E-01	1.7E-01	na	--	8.5E+00	8.5E+00	na	--	--	--	--	--	--	--	--	--	**8.5E+00**	**8.5E+00**	**na**	**--**
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	9.0E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.0E+00**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	6.5E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.5E+04**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	4.8E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.8E+04**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	9.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.5E+03**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+01**
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	8.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.5E+03**
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.9E+04**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	3.6E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.6E+05**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	5.0E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.0E+05**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	1.5E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+04**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	7.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.5E+03**
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+04**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	1.2E+01	2.8E+00	na	2.7E-02	--	--	--	--	--	--	--	--	**1.2E+01**	**2.8E+00**	**na**	**2.7E-02**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	2.2E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.2E+06**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	4.3E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+04**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	5.5E+07	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.5E+07**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	2.3E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.3E+05**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	2.7E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.7E+05**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+04**
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+03**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	2.6E-06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E-06**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	1.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.0E+02**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.1E+01	2.8E+00	na	4.5E+03	--	--	--	--	--	--	--	--	**1.1E+01**	**2.8E+00**	**na**	**4.5E+03**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.1E+01	2.8E+00	na	4.5E+03	--	--	--	--	--	--	--	--	**1.1E+01**	**2.8E+00**	**na**	**4.5E+03**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	1.1E+01	2.8E+00	--	--	--	--	--	--	--	--	--	--	**1.1E+01**	**2.8E+00**	**--**	**--**
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	4.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.5E+03**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	4.3E+00	1.8E+00	na	3.0E+00	--	--	--	--	--	--	--	--	**4.3E+00**	**1.8E+00**	**na**	**3.0E+00**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	1.5E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	--	--	na	1.1E+05
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	7.0E+03	--	--	--	--	--	--	--	--	--	--	na	7.0E+03
Fluorene	0	--	--	na	5.3E+03	--	--	na	2.7E+05	--	--	--	--	--	--	--	--	--	--	na	2.7E+05
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	5.0E-01	na	--	--	--	--	--	--	--	--	--	--	5.0E-01	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	2.6E+01	1.9E-01	na	4.0E-02	--	--	--	--	--	--	--	--	2.6E+01	1.9E-01	na	4.0E-02
Heptachlor Epoxide [C]	0	5.2E-01	3.8E-03	na	3.9E-04	2.6E+01	1.9E-01	na	2.0E-02	--	--	--	--	--	--	--	--	2.6E+01	1.9E-01	na	2.0E-02
Hexachlorobenzene [C]	0	--	--	na	2.9E-03	--	--	na	1.5E-01	--	--	--	--	--	--	--	--	--	--	na	1.5E-01
Hexachlorobutadiene [C]	0	--	--	na	1.8E+02	--	--	na	9.0E+03	--	--	--	--	--	--	--	--	--	--	na	9.0E+03
Hexachlorocyclohexane Alpha-BHC [C]	0	--	--	na	4.9E-02	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	--	--	na	2.5E+00
Hexachlorocyclohexane Beta-BHC [C]	0	--	--	na	1.7E-01	--	--	na	8.5E+00	--	--	--	--	--	--	--	--	--	--	na	8.5E+00
Hexachlorocyclohexane Gamma-BHC [C] (Lindane)	0	9.5E-01	na	na	1.8E+00	4.8E+01	--	na	9.0E+01	--	--	--	--	--	--	--	--	4.8E+01	--	na	9.0E+01
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	5.5E+04	--	--	--	--	--	--	--	--	--	--	na	5.5E+04
Hexachloroethane [C]	0	--	--	na	3.3E+01	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	1.0E+02	na	--	--	--	--	--	--	--	--	--	--	1.0E+02	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	9.0E+00	--	--	--	--	--	--	--	--	--	--	na	9.0E+00
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone [C]	0	--	--	na	9.6E+03	--	--	na	4.8E+05	--	--	--	--	--	--	--	--	--	--	na	4.8E+05
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	4.9E+01	5.6E+00	na	--	2.4E+03	2.8E+02	na	--	--	--	--	--	--	--	--	--	2.4E+03	2.8E+02	na	--
Malathion	0	--	1.0E-01	na	--	--	5.0E+00	na	--	--	--	--	--	--	--	--	--	--	5.0E+00	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	7.0E+01	3.9E+01	--	--	--	--	--	--	--	--	--	--	7.0E+01	3.9E+01	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	7.5E+04	--	--	--	--	--	--	--	--	--	--	na	7.5E+04
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	3.0E+05	--	--	--	--	--	--	--	--	--	--	na	3.0E+05
Methoxychlor	0	--	3.0E-02	na	--	--	1.5E+00	na	--	--	--	--	--	--	--	--	--	--	1.5E+00	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	1.0E+02	1.1E+01	na	4.6E+03	5.1E+03	5.6E+02	na	2.3E+05	--	--	--	--	--	--	--	--	5.1E+03	5.6E+02	na	2.3E+05
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	3.5E+04	--	--	--	--	--	--	--	--	--	--	na	3.5E+04
N-Nitrosodimethylamine [C]	0	--	--	na	3.0E+01	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+03
N-Nitrosodiphenylamine [C]	0	--	--	na	6.0E+01	--	--	na	3.0E+03	--	--	--	--	--	--	--	--	--	--	na	3.0E+03
N-Nitrosodi-n-propylamine [C]	0	--	--	na	5.1E+00	--	--	na	2.6E+02	--	--	--	--	--	--	--	--	--	--	na	2.6E+02
Nonylphenol	0	2.8E+01	6.6E+00	--	--	1.4E+03	3.3E+02	na	--	--	--	--	--	--	--	--	--	1.4E+03	3.3E+02	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	3.3E+00	6.5E-01	na	--	--	--	--	--	--	--	--	--	3.3E+00	6.5E-01	na	--
PCB Total [C]	0	--	1.4E-02	na	6.4E-04	--	7.0E-01	na	3.2E-02	--	--	--	--	--	--	--	--	--	7.0E-01	na	3.2E-02
Pentachlorophenol [C]	0	7.7E-03	5.9E-03	na	3.0E+01	3.8E-01	2.9E-01	na	1.5E+03	--	--	--	--	--	--	--	--	3.8E-01	2.9E-01	na	1.5E+03
Phenol	0	--	--	na	8.6E+05	--	--	na	4.3E+07	--	--	--	--	--	--	--	--	--	--	na	4.3E+07
Pyrene	0	--	--	na	4.0E+03	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	--	--	na	2.0E+05
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	1.0E+03	2.5E+02	na	2.1E+05	--	--	--	--	--	--	--	--	**1.0E+03**	**2.5E+02**	**na**	**2.1E+05**
Silver	0	1.0E+00	--	na	--	5.2E+01	--	na	--	--	--	--	--	--	--	--	--	**5.2E+01**	--	**na**	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	--	--	**na**	**2.0E+03**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.7E+03**
Thallium	0	--	--	na	4.7E-01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.4E+01**
Toluene	0	--	--	na	6.0E+03	--	--	na	3.0E+05	--	--	--	--	--	--	--	--	--	--	**na**	**3.0E+05**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	3.7E+01	1.0E-02	na	1.4E-01	--	--	--	--	--	--	--	--	**3.7E+01**	**1.0E-02**	**na**	**1.4E-01**
Tributyltin	0	4.6E-01	7.2E-02	na	--	2.3E+01	3.6E+00	na	--	--	--	--	--	--	--	--	--	**2.3E+01**	**3.6E+00**	**na**	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	3.5E+03	--	--	--	--	--	--	--	--	--	--	**na**	**3.5E+03**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	8.0E+03	--	--	--	--	--	--	--	--	--	--	**na**	**8.0E+03**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	1.5E+04	--	--	--	--	--	--	--	--	--	--	**na**	**1.5E+04**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	1.2E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.2E+03**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	1.2E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.2E+03**
Zinc	0	6.5E+01	6.5E+01	na	2.6E+04	3.2E+03	3.3E+03	na	1.3E+06	--	--	--	--	--	--	--	--	**3.2E+03**	**3.3E+03**	**na**	**1.3E+06**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	3.2E+04
Arsenic	4.5E+03
Barium	na
Cadmium	2.0E+01
Chromium III	1.3E+03
Chromium VI	3.2E+02
Copper	1.4E+02
Iron	na
Lead	1.7E+02
Manganese	na
Mercury	2.3E+01
Nickel	3.4E+02
Selenium	1.5E+02
Silver	2.1E+01
Zinc	1.3E+03

Note: do not use QL's lower than the minimum QL's provided in agency guidance

pH and Temperature Data
3-RPP104.47 Apr 2007 to Dec 2009

Collection Date	Temp (C)	pH (SU)
11-Apr-07	10.7	7.9
6-Jun-07	26.2	7.1
8-Aug-07	30.0	7.0
10-Oct-07	24.7	6.9
11-Dec-07	5.3	7.0
12-Feb-08	4.6	7.0
8-Apr-08	10.8	7.0
10-Jun-08	29.9	7.2
12-Aug-08	26.5	7.6
15-Oct-08	19.9	7.3
18-Dec-08	6.7	7.0
10-Feb-09	5.1	7.1
16-Apr-09	11.8	7.2
16-Jun-09	25.0	7.3
20-Oct-09	11.5	7.1
3-Dec-09	9.0	7.3
90th Percentile	**28.2**	**7.5**
10th Percentile		**7.0**

```
7/26/2012 7:06:48 AM

Facility  = Hopyard Farms WWTP
Chemical  = Dissolved Zinc
Chronic averaging period =  4
WLAa     =  120
WLAc     =  330
Q.L.      = 20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

# observations = 1
Expected Value =  42
Variance       =  635.04
C.V.           = 0.6
97th percentile daily values  =  102.203
97th percentile 4 day average =  69.8791
97th percentile 30 day average=  50.6542
# < Q.L.       =  0
Model used     = BPJ Assumptions, type 2 data


 No Limit is required for this material


The data are:


 42
```

March 2010
MEMORANDUM

TO:	Virginia Institute of Marine Science (VIMS) Model for the Tidal Rappahannock File
FROM:	Alison Thompson, Water Permitting -- NRO
SUBJECT:	Virginia Institute of Marine Science Model for the Tidal Rappahannock. Input Assumptions and Summaries through December 2009

This memo summarizes all of the VIMS model inputs, assumptions, and results made to date, documenting the use of and decisions reached with the model.

The last major update to the inputs to the model was dated January 2005. It was the model run for the expansion of the Little Falls Run STP from 8.0 MGD to 13.0 MGD. In addition, staff made changes to the VIMS point source inputs due to the regulatory initiatives regarding nutrient loadings to the Chesapeake Bay. This analysis accounted for the status of the nutrient regulations in January 2005. In August 2006, staff did a correction to the model for the Fredericksburg STP flow used for the nutrient loadings. The most recent work, and the basis for this memorandum, was done because DEQ received a modification request from Spotsylvania County to move 1.4 MGD flow from FMC to the Massaponax STP.

Background

Stafford County, Spotsylvania County, and the City of Fredericksburg funded a water quality model for the upper Rappahannock River estuary developed by the Virginia Institute of Marine Science (VIMS), entitled A Modeling Study of the Water Quality of the Upper Rappahannock River (VIMS Model). This model was approved by the State Water Control Board Director on December 6, 1991. This model is used to determine effluent limitations for new and expanded discharge requests in the upper Rappahannock River, from the fall line at Fredericksburg to the Rt. 301 Bridge in King George County. VIMS documentation of the model is contained in *A Modeling Study of the Water Quality of the Upper Rappahannock River*, October 1991. A copy of the report as well as the program and general correspondence is contained in the Department of Environmental Quality (DEQ) Northern Regional Office (NRO) Rappahannock Model File.

There are 32 river miles between the fall line and the Rt. 301 Bridge. The model divides this 32 mile segment of the river into 33 model segments (see Figure 1 for discharger locations). The following point source discharges are included in the current model run:

Segment 3:	Fredericksburg STP	VA0025127	4.5 MGD
Segment 4:	FMC WWTP	VA0068110	4.0 MGD
Segment 9:	Little Falls Run STP	VA0076392	13.0 MGD
	Massaponax STP	VA0025658	9.4 MGD
Segment 20:	Four Winds Campground	VA0060429	0.210 MGD
Segment 23:	Hopyard Farm WWTP	VA0089338	0.50 MGD
Segment 26:	Haymount STP	VA0089125	0.96 MGD

Regulations affecting the VIMS model inputs

The 2008 303(d)/305(b) Integrated Report (2008 IR) indicates that the tidal, freshwater portion of the Rappahannock River (which encompasses the entire extent of this model) is impaired for not meeting the aquatic life use due to low levels of dissolved oxygen. Specifically, an open water assessment of dissolved oxygen values during the summer season showed that the tidal, freshwater Rappahannock River (RPPTF) does not meet water quality standards. The total maximum daily load (TMDL) for this impairment is due by 2010, as part of the Chesapeake Bay wide TMDL to address excess nutrients and sediment affecting the Bay.

In addition, the 2008 IR also listed the tidal, freshwater Rappahannock River as impaired for not meeting the fish consumption use, due to elevated levels of Polychlorinated Biphenyls (PCBs) in fish tissue. The Virginia Department of Health issued a fish consumption advisory for the Rappahannock River below the fall line that limits American eel, blue catfish, carp, channel catfish, croaker, gizzard shad, and anadromous (coastal) striped bass consumption to no more than two meals per month. The affected area extends from the I-95 bridge above Fredericksburg downstream to the mouth of the river near Stingray Point, including its tributaries Hazel Run up to the I-95 bridge crossing and Claiborne Run up to the Route 1 bridge crossing. The TMDL study for this impairment is due by 2016.

Finally, the tidal, freshwater Rappahannock River, from the Route 1 bridge in Fredericksburg, downstream to the confluence with Mill Creek (near the Route 301 bridge crossing) is listed as impaired for not supporting the recreational use due to exceedances of the *E. coli* bacteria criterion. A TMDL was developed for the bacteria impairment in 2007-2008. The TMDL was approved by EPA on 05/05/2008.

As of the drafting of this memo, the preliminary 2010 303(d)/305(b) Integrated Assessment indicates that the open-water aquatic life sub-use (assessed using dissolved oxygen data) for the tidal, freshwater Rappahannock River is fully supporting. There is insufficient information to determine if the aquatic life sub-use for migratory fish spawning and nursery is being met; thus, the overall aquatic life use is also listed as having insufficient information to make an assessment.

Virginia has committed to protecting and restoring the Bay and its tributaries. Currently the Agency has developed nutrient water quality standards for the Bay and its tributaries, amended the Nutrient Policy (9 VAC 25-40-10) to govern the inclusion of technology-based, numerical nitrogen and phosphorus limits in VPDES permits, and a parallel effort updating and amending the Water Quality Management Planning (WQMP) regulation 9 VAC 25-720. The Water Quality Standards for the Bay were adopted in March 2005. The WQMP regulation includes Total Nitrogen and Total Phosphorus Wasteload Allocations for all Chesapeake Bay Program Significant Discharge List (CBP SDL) discharges.

The total phosphorous loadings based on the Nutrient Policy and/or from the WQMP for the applicable facilities are as follows:

Fredericksburg STP (4.5 MGD; 0.3 mg/L)	4,111 lb/year
FMC WWTP (5.4 MGD; 0.3 mg/L)	4,934 lb/year
Little Falls Run STP (8.0 MGD; 0.3 mg/L)	7,309 lb/year
Massaponax STP (8.0 MGD; 0.3 mg/L)	7,309 lb/year
Four Winds Campground (0.21 MGD)	640 lb/year. Not in the WQMP, but must meet 1.0 mg/L annual average
Haymount STP (0.96 MGD; 0.3 mg/L)	877 lb/year
Hopyard Farm WWTP (0.5 MGD; 0.3 mg/L)	457 lb/year

The total nitrogen loadings based on the Nutrient Policy and from the WQMP for the applicable facilities are as follows:

Fredericksburg STP (4.5 MGD; 4.0 mg/L)	54,819 lb/year
FMC WWTP (5.4 MGD; 4.0 mg/L)	65,784 lb/year
Little Falls Run STP (8.0 MGD; 4.0 mg/L)	97,458 lb/year
Massaponax STP (8.0 MGD; 4.0 mg/L)	97,458 lb/year
Four Winds Campground (0.21 MGD)	5100 lb/year. Not in the WQMP, but must meet 8.0 mg/L annual average
Haymount STP (0.96 MGD; 4.0 mg/L)	11,695 lb/year

Hopyard Farm WWTP (0.5 MGD; 4.0 mg/L) 6091 lb/year.

In addition to the nutrient initiatives, the changes to the Water Quality Standards for the Chesapeake Bay and tidal waters included criteria for dissolved oxygen, water clarity, chlorophyll a, and Designated Uses. The dissolved oxygen standard for migratory fish waters for the months of February through May is a 7-day mean of greater than of 6.0 mg/L. For the months of June through January, the minimum is 5.5 mg/L. These dissolved oxygen criteria apply to the upper tidal portion of the Rappahannock River.

RADCO 208 Plan

The Rappahannock Area Development Commission (RADCO) 208 Area Waste Treatment Management Plan was adopted in August 1977, was amended in September 1983, and was repealed in 2004. The loading allocations in it had to be maintained until the Plan was repealed. The loading allocations in the Plan were based on an old water quality model, AUTO$$, that was replaced in 1991 by the VIMS model.

The VIMS model has demonstrated that nutrients are the primary factor affecting water quality in the upper tidal Rappahannock River. Numerous runs of the model have demonstrated that cBOD is not as influential as the nutrients at the maximum permitted flows of each POTW. As such, cBOD loadings are permissible above the levels specified in the old RADCO Plan.

Model Timeline

To date the model has been run seven times, each being necessitated by a request for a flow increase or for a new discharge. The runs are as follows:

1. August 14, 1995 - expansion of Fredericksburg STP from 3.5 to 4.5 MGD
   - addition of 0.93 MGD Haymount STP in Caroline County
2. August 22, 1996 - addition of 0.25 MGD Hopyard Farm WWTP in King George County
3. March 17, 1997 - flow increase and production increase at White Packing
4. April 7, 1999 - expansion of Little Falls Run STP from 4.0 to 8.0 MGD
   - expansion of Massaponax STP from 6.0 to 8.0 MGD
5. December 1, 2000 - expansion of FMC WWTP from 4.0 to 5.4 MGD
6. April 29, 2003 - expansion of the proposed Hopyard Farm WWTP from 0.25 to 0.50 MGD.
7. January 26, 2005 -remove White Packing from Segment 26 since the facility is closed
   -correction of Haymount STP flow to 0.96 (previously was 0.93)
   -addition of 1.0-MGD Greenhost – Village Farms in King George County
   -expansion of Little Falls Run STP from 8.0 to 13.0 MGD
   -incorporation of the WQMP nutrient loadings for the Significant Dischargers
8. August 2006 - correct nutrient loadings for the City of Fredericksburg
9. December 2009 - shift 1.4 MGD flow from FMC to Massaponax (will now be 9.4 MGD)
   - change the distribution of the nitrogen species based on the data obtained from the Discharge Monitoring Reports.

The initial run on August 14, 1995, has been considered the background condition for the river segments. The VIMS files located at DEQ-NRO contain the supporting documentation for the original model inputs and the subsequent model runs. With each successive run of the model, all parameters had been kept constant except those affected by the request necessitating the model run. The most recent model runs affected a change to the nutrient loadings for all the dischargers. In the older model runs, staff used best professional judgment to determine the distribution of the three nitrogen species: Ammonia as Nitrogen, Total Kjeldahl Nitrogen, and Oxidized Nitrogen (Nitrate+Nitrite). The January 2010 run looked at actual performance data from the four largest facilities and found that the old assumptions were not correct. The old assumptions were Ammonia as Nitrogen (25%), Total Kjeldahl Nitrogen (25%), and Oxidized Nitrogen (50%). The actual performance data from these larger facilities is Ammonia as Nitrogen (3%), Total Kjeldahl Nitrogen (37%), and Oxidized Nitrogen (60%).

Antidegradation Analysis

With each running of the model, and/or permit action concerning this section of the Rappahannock River, an antidegradation analysis has been conducted in accordance with the water quality standards and DEQ guidance. This is a difficult task since the assessment and designation of Tier I or Tier II waters is partially subjective given the narrative criteria of the standards, water quality data are not static, and waterbody boundaries are not well defined.

Since the onset of using this model, the established model segments have been used, by default, to define river sections into individual waterbodies for the antidegradation analysis. DEQ did not suggest or contend that these model segments should be used for other water quality management purposes. It was recognized that the river from the fall line down to the Rt. 301 Bridge could have been, and perhaps should have been, considered one waterbody segment. DEQ also acknowledged that this whole segment of the Rappahannock River could have been assessed as Tier I since it is considered nutrient enriched and turbid and therefore subject to corrective plans outlined in the *1999 Tributary Strategy for the Rappahannock River and Northern Neck Coastal Basins*. However, being uncertain DEQ elected to evaluate antidegradation, as through each of the model segments were actual distinct waterbodies. This approach was conservative in terms of protecting water quality and to date did not prove to be an undo burden to any of the dischargers.

Historically, four segments were identified as Tier II through this process: segment 16, segment 20, segment 23, and segment 26. Each was identified through separate permit actions that did not initially involve the VIMS model. When a segment was analyzed as Tier II, two parameters generally were assessed, ammonia and dissolved oxygen (DO). Ammonia levels were kept below the baselines and DO was kept to no lower than 0.2 mg/L of the concentration predicted in the August 14, 1995 background model run. The VIMS memo dated April 29, 2003 contains the historical summary and table of the baselines of the Tier determinations for each of the four segments.

During the January 2005 model run analysis, the entire Rappahannock River was determined to be Tier I. The previous determination of Tier II ratings for segments 16, 20, 23, and 26 were made with adherence to guidance with little best professional judgement by staff. It has been 10 years since the initial runs of the model and staff no longer believes it appropriate to assign a tier rating for each model segment. Staff believes it is best to rate the whole segment from the fall line to the Route 301 bridge as one segment. The nutrient enrichment problems of this segment, as evident by high turbidity, warrant a Tier I rating. Staff again makes this determination for the sole purpose of assigning permit limits. And since the Tier ratings have had very little influence on the results of the model, there is no measurable consequence to this change, and there is no need to continue to assess these segments (16, 20, 23, and 26) as being different from the whole river segment.

It should be noted that the predicted concentrations of dissolved oxygen and ammonia are significantly different in this current model run than what was considered the "background" concentrations. With the new loading allocations to the significant discharges in place, the model predicts that chlorophyll concentrations will be significantly less than what prior model runs have predicted and the artificially elevated levels of dissolved oxygen (nutrients stimulate chlorophyll growth and chlorophyll photosynthesis generates dissolved oxygen) are no longer predicted. Further discussion of chlorophyll a is found in the next section.

Total Phosphorus Loading Cap (historical perspective)

All of the above facilities discharge into the tidal freshwater Rappahannock River. This section of the river was formerly designated as nutrient enriched waters. Specifically, the Tidal freshwater Rappahannock River from the fall line to Buoy 44 near Leedstown, Virginia, including all tributaries to their headwaters that enter the tidal freshwater Rappahannock River were classified as nutrient enriched waters. All dischargers into nutrient enriched waters as designated in the Water Quality Standards for Nutrient Enriched Waters that were permitted before July 1, 1988, and that discharge 1 MGD or more were subject to the Policy for Nutrient Enriched Waters. This policy required facilities to meet a monthly average Total Phosphorus limitations of 2.0 mg/L and to monitor for monthly average Total Nitrogen concentration and loading values. The application of standards to protect nutrient enriched waters within the Chesapeake Bay watershed was replaced in Virginia by the aforementioned regulatory programs governing nutrient and sediment inputs into the Bay. Thus, the nutrient enriched waters designation was removed from the Water Quality Standards.

Based on the prior VIMS model runs, the chlorophyll a levels in the upper segments of the river in the Fredericksburg area approached 100 ug/L under design conditions. It is staff's best professional judgment that high chlorophyll a concentrations and the corresponding high alga growth mask dissolved oxygen depletion due to BOD loading. The model provides a 30-day average output and it is hypothesized that the elevating effect of the chlorophyll concentrations is more significant than the depleting effect of the BOD loadings. If the model provided daily outputs, one could see the diurnal dissolved oxygen sag and super-saturation effects in an over-enriched system. Further, the model demonstrated that chlorophyll a concentrations increased with additional phosphorus (P) loadings. If P limits for the expanding STPs were based solely on the Nutrient Policy, 2 mg/L, then chlorophyll a levels would exceed 120 ug/L in the waters around the City of Fredericksburg. To prevent further increases in chlorophyll a concentrations in this part of the river, total phosphorus loadings (mass based, kg/day) were not allowed to increase for the Fredericksburg, FMC, Massaponax, and Little Falls Run wastewater treatment plants beyond the current limits. All future requests for flow increases at these facilities required that the P mass limits remain constant at the current loading limits. Permitted phosphorus concentration limits may remain at the same level prescribed by the Nutrient Policy, 2 mg/L, since it is the total mass loading that impacts chlorophyll levels. However, as effluent flows increase, in order to meet the mass limitations, effluent concentrations had to be below the 2 mg/L limit.

The relationship of how chlorophyll photosynthesis affects dissolved oxygen levels has been explored in this model and it was worth recognizing what historical baseline/initial levels were. These values were useful in the subsequent model runs for tracking how nutrients inflated dissolved oxygen levels (nutrients stimulate chlorophyll growth and chlorophyll photosynthesis generates dissolved oxygen).

DEQ has adopted a chlorophyll a narrative standard at 9VAC25-260-185 that states, "Concentrations of chlorophyll a in free-floating microscopic aquatic plants (algae) shall not exceed levels that result in undesirable or nuisance aquatic plant life, or render tidal waters unsuitable for the propagation and growth of a balanced, indigenous population of aquatic life or otherwise result in ecologically undesirable water quality conditions such as reduced water clarity, low dissolved oxygen, food supply imbalances, proliferation of species deemed potentially harmful to aquatic life or humans or aesthetically objectionable conditions."

Summary of past model runs

In the 1995 VIMS model, the winter inputs for ammonia and organic nitrogen for all wastewater treatment plants were 14 mg/L ammonia and 14 mg/L organic nitrogen. These values represented little to no nitrification. The model indicated that there were no far field violations of the winter ammonia standards. Therefore, no winter ammonia or TKN limits were established for Fredericksburg, FMC, Massaponax, and Little Falls Run wastewater treatment plants. The acute ammonia criterion for the winter months was 12.07 mg/L. DEQ did not impose winter acute based ammonia limits on any of the treatment plants for the following reasons: the discharges are located near the fall line where tidal influences are the smallest; the net advective flow of the river dominates the tidal influence; the design flows are much smaller than the critical flows of the river; ammonia decays rather rapidly; and each of the plants were achieving varying degrees of nitrification.

During the April 7, 1999 model run, winter ammonia loading had to be lowered for Little Falls Run and Massaponax from 14 mg/L to 12 mg/L in order to meet the antidegradation baselines in segment 23 and 26. Since organic nitrogen would also decrease during the nitrification process, its input into the model was also lowered to 12 mg/L for both dischargers. During this model run, the winter ammonia loadings for FMC were also lowered to 12 mg/L to meet the antidegradation baselines of segments 16, 23, and 26. At the new flows for FMC, water quality criteria and antidegradation baselines are still protective for the summer months of May – October. Since organic nitrogen would also decrease during the nitrification process, its input into the model was also lowered to 12 mg/L for FMC. Acute based ammonia limits were imposed at the new flows for the same reasons cited above. However, since the new model inputs were lower than the acute ammonia water quality standard of 12.07 mg/L, it was certain that the acute standard was protected in the winter.

In the December 1, 2000 model run, two minor data entry problems were corrected in conjunction with the expansion of FMC to 5.4 MGD. First, in the original model documentation memorandum of August 14, 1995, the assumption was made that total effluent nitrogen levels for these types of plants would be 30 mg/L, and that it would exist in the form of organic nitrogen, ammonia, and/or inorganic nitrogen depending on the facility's ability to nitrify. This can be seen on page 1 under the section "Assumptions for nitrogen". However, the value shown for the three separate nitrogen parts add up to 32 mg/L. It was felt that this was a simple oversight at the time. Additionally, during the April 7, 1999 model run, nitrate-nitrite levels were increased to 21 mg/L and 24 mg/L for the Little Falls Run and Massaponax dischargers respectively, even though the ammonia nitrogen levels were set at 12 mg/L. Therefore, in order to maintain the original model assumptions, winter nitrate input levels were reset to 6 mg/L during this run for Little Falls Run, Massaponax, and FMC. Since the Fredericksburg inputs had not been adjusted, nor had they recently been adjusted, the original values were maintained (14 mg/L organic-N, 14 mg/L Ammonia-N, and 4 mg/L Nitrate/Nitrite). Second, the ammonia loadings for the Haymount STP were incorrectly entered as 8.61 kg/d. The correct loading was entered as 3.53 kg/d. This correction had little to no impact on the model outputs.

In the April 29, 2003, model run all numerical criteria were met and all antidegradation baselines for ammonia and DO were met except for one. In the winter run, segment 23 (Hopyard Farm) yielded a DO of 7.43 mg/L. The baseline for DO in this segment is 7.47 mg/L. In order to maintain the additional 0.04 mg/L of DO, the BOD concentrations of Hopyard Farm and the upstream dischargers would have to be significantly reduced. DEQ did not believe this reduction was warranted since the model was run based on design capacity flows for all facilities and not just for Hopyard Farm. In addition, the DO deficit for segment 23 actually improved from 0.07 mg/L to 0.04 mg/L with the increase in Hopyard Farm's flows. Therefore, changes to the effluent limits were not necessary for such a small change in DO since the model is not that sensitive or accurate.

In January 2005, the model run was conducted to include the expansion of the Little Falls Run STP, the removal of White Packing, the correction of the Haymount STP flow, and the addition of Greenhost – Village Farms because of observed nutrient concentrations in the discharge. This model run also assumed that the Nutrient Policy and the WQMP regulation were adopted. Effluent loadings for $cBOD_5$ and Dissolved Oxygen were derived by multiplying the current concentration limits by the maximum permitted flow. For the facilities that are contained in the draft WQMP regulation, nutrient loadings were derived using the flows and loadings presented in draft regulation. For Four Winds Campground, nutrient loadings were derived using a total nitrogen concentration of 8.0 mg/L and a total phosphorus concentration of 1.0 mg/L based on the draft Nutrient Policy. For Hopyard Farm WWTP, nutrient loadings were derived using a total nitrogen concentration of 4.0 mg/L and a total phosphorus concentration of 0.3 mg/L based on what was the draft WQMP. Best professional judgement and actual effluent data were used to determine the loadings for Greenhost- Village Farms. There was a small excursion of the Migratory fish spawning an nursery dissolved oxygen concentration of $\geq$6 mg/L; the excursion was 5.6 mg/L. Staff did not change the BOD limits for the dischargers but recommended increased ambient monitoring of the upper tidal Rappahannock River.

Current Model Run Summary

The model was run for the summer (May- October) period because this is the most critical time and when potential dissolved oxygen excursions have been noted during past model analyses. Historically, no problems have been noted with chlorophyll or dissolved oxygen in the winter runs. It should be noted that before the model runs could be fully analyzed and other scenarios attempted, the computer that this model runs on began to fail. The older programming (Leahy Fortran) used for the VIMS model no longer runs on the newer computers. Therefore, additional modeling cannot be performed without updating the code of the VIMS model.

Summer continues to be the critical period for the water quality of the upper tidal freshwater Rappahannock River because stream flows are typically lower and the dischargers have a greater influence on the water quality in the river, and alga growth is higher during the warmer temperatures of the summer months.

Staff ran a baseline run for the summer with Massaponax at 8 MGD; the baseline run did have the nitrogen allocations changed to reflect actual effluent characteristics, as discussed above. Model runs were also done with Massaponax at 9.4 MGD, Massaponax at 9.4 MGD and all facilities meeting the WQMP conditions, all FMC flow moved to Massaponax, and all flow from FMC and the City of Fredericksburg moved to Massaponax.

<u>Chlorophyll a & Nutrients</u>

When the WQMP is fully implemented, the model predicts chlorophyll a levels to drop substantially even when all the dischargers are at full capacity. The WQMP essentially reduces and places total nitrogen and total phosphorus loading caps on the significant dischargers. By removing the WWTP nutrient food sources for the algae, alga populations fall and thus, chlorophyll a levels are reduced. As noted earlier in this memorandum, staff also reallocated the nitrogen species based on the performance of the upgraded facilities. This also changed the output predictions from former analyses. It is staff's best professional judgment that moving the 1.4 MGD flow from FMC to Massaponax will not have any negative effects on the chlorophyll a and nutrient concentrations in the River.

<u>Dissolved Oxygen</u>

Class II tidal waters in the Chesapeake Bay and it tidal tributaries must meet dissolved oxygen concentrations as specified in 9VAC25-260-185. In the Northern Virginia area, Class II waters must meet the Migratory Fish Spawning and Nursery Designated Use from February 1 through May 31. For the remainder of the year, these tidal waters must meet the Open Water use.

Designated Use	Criteria Concentration/Duration	Temporal Application
Migratory fish spawning and nursery	7-day mean > 6 mg/L (tidal habitats with 0-0.5 ppt salinity)	February 1 – May 31
	Instantaneous minimum > 5 mg/L	
Open-water[1,2]	30-day mean > 5.5 mg/L (tidal habitats with 0-0.5 ppt salinity) 30-day mean > 5 mg/L (tidal habitats with >0.5 ppt salinity)	Year-round
	7-day mean > 4 mg/L	
	Instantaneous minimum > 3.2 mg/L at temperatures < 29°C Instantaneous minimum > 4.3 mg/L at temperatures > 29°C	
	1-day mean > 2.3 mg/L	
	Instantaneous minimum > 1.7 mg/L	

[1]See subsection aa of 9 VAC 25-260-310 for site specific seasonal open-water dissolved oxygen criteria applicable to the tidal Mattaponi and Pamunkey Rivers and their tidal tributaries.

[2]In applying this open-water instantaneous criterion to the Chesapeake Bay and its tidal tributaries where the existing water quality for dissolved oxygen exceeds an instantaneous minimum of 3.2 mg/L, that higher water quality for dissolved oxygen shall be provided antidegradation protection in accordance with section 30 subsection A.2 of the Water Quality Standards.

The model results show protection of the dissolved oxygen criteria except for the month of May in several segments. The current temporal application of the dissolved oxygen standards is different than the temporal application of the model, i.e., May is classified in the summer period. The migratory fish spawning and nursery Designated Use also looks at a 7-day mean, but the model only has a 30-day output. At this time, staff does not feel any changes are necessary to the cBOD limits for the dischargers because:

1) The excursion is very small; 5.6 mg/L is the predicted concentration in segment 13 when the Massaponax flow is at 9.4 and all facilities are at the WQMP loadings and concentrations.
2) The model is not that accurate to warrant substantial changes to the STPs to achieve such a small difference in dissolved oxygen. The accuracy of the model is questionable since it was developed over 20 years ago.
3) The model assumes May to be like July, August, and September, when in fact it is not, i.e., the water temperature is cooler and the background flows are higher.

<u>VIMS Model</u>

Due to the age of the model and the development and changes that have occurred in the localities, staff will also inform the localities that any additional changes to design flows will require an update to the VIMS model. Staff recommends that the following be considered when the model is updated:

1) The model currently provides only a 30-day average output. It would be useful to have the ability to generate hourly, daily or other shorter averaging periods. A more refined model will allow better understanding of the relationships between DO, chlorophyll a, BOD, and nutrients.
2) Consider land use and hydrologic changes that have occurred and the associated changes to water flow, quantity and quality dynamics, especially since the Embry Dam has been removed from the River.

Table 1
Current Model Associated Limits for All Dischargers in VIMS Model

Discharger Permit No.	Fredericksburg VA0025127	FMC VA0068110	Little Falls Run VA0076392	Massaponax VA0025658	Four Winds VA0060429	Hopyard Farm VA0089338	Haymount VA0089125
Segment	3	4	9	9	20	23	26
River Mile	108.64	107.37	104.61	104.67	92.2	89.8	85.10
Flow (MGD)	4.5	5.4	13.0	9.4	0.210	0.50	0.96
BOD5 (mg/L, kg/d)	N/A	N/A	N/A	N/A	30/23.8	30/56.77	N/A
cBOD5 (mg/L, kg/d)	13.0 / 221	15.0 / 306.6	9.0 /440	10.0 / 356	N/A	N/A	10.0 / 36
TKN (summer) (mg/L, kg/d)	7.0 /119.23	3.0 / 61.3	6.0 /295	9.0 / 320	2.29/1.82	N/A	3.0 / 10.9
TKN (winter) (mg/L, kg/d)	NL	N/A	NL	NL	3.41/2.71	N/A	N/A
Ammonia (summer) (mg/L, kg/d)	N/A	N/A	4.7	N/A	N/A	10.7/20.2	N/A
Ammonia (winter) (mg/L, kg/d)	N/A	N/A	4.7	12.0 / 427	N/A	12.4/23.4	N/A
Total Phosphorous (kg/d)	26.5	30.3	30.3	45.4	1.59	3.78	7.3
Dissolved Oxygen (mg/L)	6.0	6.0	6.0	6.0	6.0	6.0	6.0

N/A – Not Applicable
NL – No Limit

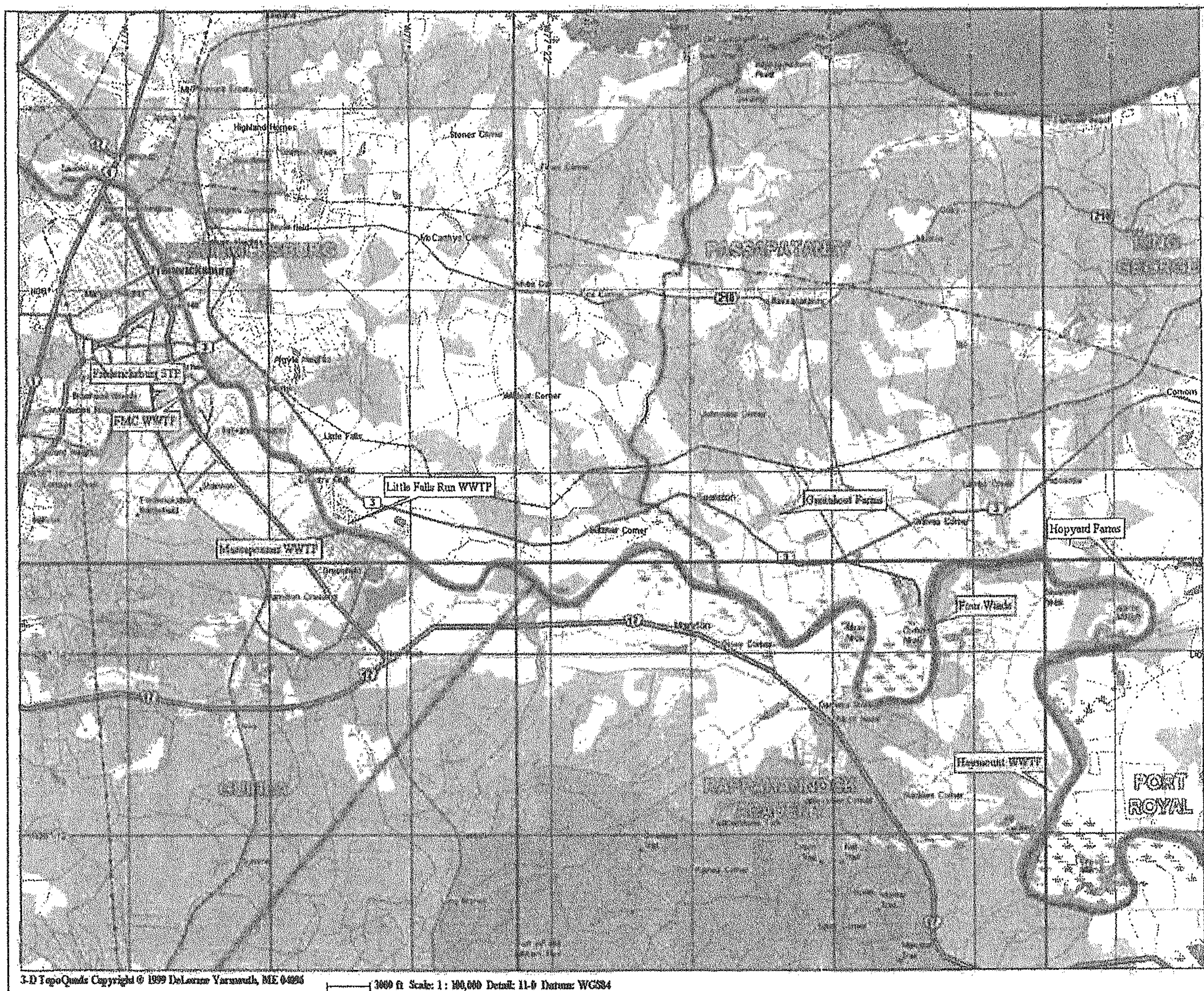


Figure 1
Discharger Locations

Public Notice – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in King George County, Virginia.

PUBLIC COMMENT PERIOD: XXX, 2012 to 5:00 p.m. on XXX, 2012

PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater issued by DEQ, under the authority of the State Water Control Board

APPLICANT NAME, ADDRESS AND PERMIT NUMBER: King George County Service Authority, 9207 Kings Hwy, King George, VA 22485, VA0089338

NAME AND ADDRESS OF FACILITY: Hopyard Farms WWTP, State Route 607 (Port Conway Rd), King George, VA 22485

PROJECT DESCRIPTION: NAME OF APPLICANT has applied for a reissuance of a permit for the public Hopyard Farms WWTP. The applicant proposes to release treated sewage wastewaters from residential areas at a rate of 0.375 million gallons per day into a water body with future expansion to 0.5 million gallons per day. The sludge will be disposed by pump and haul to the Dahlgren WWTP for further treatment. The facility proposes to release the treated sewage in the Rappahannock River in King George County in the Rappahannock watershed. A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: pH, BOD, Total Suspended Solids, Ammonia as N, Total Nitrogen, Total Phosphorus, Dissolved Oxygen, and *E. coli*.

This facility is subject to the requirements of 9 VAC 25-820 and has registered for coverage under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia.

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION: The public may review the documents at the DEQ-Northern Regional Office by appointment, or may request electronic copies of the draft permit and fact sheet.
Name: Alison Thompson
Address: DEQ-Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193
Phone: (703) 583-3834 E-mail: Alison.Thompson@deq.virginia.gov Fax: (703) 583-3821

Revised 2/2003

State "Transmittal Checklist" to Assist in Targeting
Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name:	Hopyard Farms WWTP
NPDES Permit Number:	VA0089338
Permit Writer Name:	Alison Thompson
Date:	July 25, 2012

Major [ ] **Minor** [X] **Industrial** [ ] **Municipal** [X]

I.A. Draft Permit Package Submittal Includes:	**Yes**	**No**	**N/A**
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?	X		
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters of concern?			X
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?	X		
8. Whole Effluent Toxicity Test summary and analysis?			X
9. Permit Rating Sheet for new or modified industrial facilities?			X

I.B. Permit/Facility Characteristics	**Yes**	**No**	**N/A**
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet **or** permit contain a description of the wastewater treatment process?	X		
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?		X	
5. Has there been any change in streamflow characteristics since the last permit was developed?		X	
6. Does the permit allow the discharge of new or increased loadings of any pollutants?		X	
7. Does the fact sheet **or** permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water?	X		
a. Has a TMDL been developed and approved by EPA for the impaired water?	X		
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?			X
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?	X		
9. Have any limits been removed, or are any limits less stringent, than those in the current permit?		X	
10. Does the permit authorize discharges of storm water?		X	

I.B. Permit/Facility Characteristics – cont.	Yes	No	N/A
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?		X	
12. Are there any production-based, technology-based effluent limits in the permit?		X	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		X	
14. Are any WQBELs based on an interpretation of narrative criteria?		X	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		X	
16. Does the permit contain a compliance schedule for any limit or condition?		X	
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?		X	
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?	X		
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

Part II. NPDES Draft Permit Checklist

Region III NPDES Permit Quality Checklist – for POTWs
(To be completed and included in the record only for POTWs)

II.A. Permit Cover Page/Administration	**Yes**	**No**	**N/A**
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

II.B. Effluent Limits – General Elements	**Yes**	**No**	**N/A**
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?	X		

II.C. Technology-Based Effluent Limits (POTWs)	**Yes**	**No**	**N/A**
1. Does the permit contain numeric limits for ALL of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			X
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

II.D. Water Quality-Based Effluent Limits	**Yes**	**No**	**N/A**
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL? Bacteria	X		
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	X		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?	X		
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	X		

II.D. Water Quality-Based Effluent Limits – cont.	Yes	No	N/A
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	X		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		X	
4. Does the permit require testing for Whole Effluent Toxicity?		X	

II.F. Special Conditions	Yes	No	N/A
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?			X

II.F. Special Conditions – cont.	Yes	No	N/A
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			X
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?			X
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?		X	
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?		X	
a. Does the permit require implementation of the "Nine Minimum Controls"?			X
b. Does the permit require development and implementation of a "Long Term Control Plan"?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?			X

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		
List of Standard Conditions – 40 CFR 122.41 Duty to comply Duty to reapply Need to halt or reduce activity not a defense Duty to mitigate Proper O & M Permit actions Property rights Duty to provide information Inspections and entry Monitoring and records Signatory requirement Bypass Upset Reporting Requirements Planned change Anticipated noncompliance Transfers Monitoring reports Compliance schedules 24-Hour reporting Other non-compliance			
2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	X		

Part III. Signature Page

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Alison Thompson
Title	Water Permits Technical Reviewer
Signature	
Date	7/25/12